The Delaware Sewage Disposal Plant

By RAYMOND SCHMITT

Delaware, with a population of between 10,000 and 15,000, needed a sewerage system capable of handling a capacity of about 1½ million gallons of sewage per day. Consequently, in May 1926, the contract drawings for the treatment works were completed.

The site was selected on the west bank of the Olentangy River about 1/3 mile southeast of the Ohio Wesleyan grounds. At the time of construction not all the proposed structures were completed, but provisions were made for future additions.

Today, the first thing that catches your eye as you visit the plant is the neatly arranged pumping station. There is a curved drive with two exits to the road. On both sides of the drive and all around the building you see a three foot hedge which really sets off the landscaping. On the little plot of green, between the drive and the road, a flagpole towers. The entire works are surrounded by well kept lawns with a high dike at their extremities.

The pumping station has a main floor and two basements. On the main floor we find the testing laboratory where samples of sewage are diagnosed for the amount of solid matter retained in them after the sewage has undergone the complete treatment. The office and the terrace to the two basements comprise the rest of the main floor.

Descending the first flight of stairs we find a huge water supply unit. The boiler room and coal room on the same floor are entirely underground, that is, they are additions to the main plan. In a separate little basement, likewise on the same level, are the intake and bar screen for the entire works. The function of the screens is to remove from sewage all matter larger than the openings in the screen and matters large enough to interfere with the operation of the type of pump used. For centrifugal pumps, as those used at Delaware, the operation is seldom interfered with by objects whose largest dimension is less than two-thirds the diameter of the suction or discharge opening of the pump.

The second basement harbors the big centrifugal pumps that force the sewage through to the sludge basin. These pumps are controlled automatically by float valves located on the main terrace. Check valves may be found on all pumps to prevent back flow.

On its way to the sludge basin, the sewage passes through a meter and a set of valves which direct it to different parts of the basin.

The sludge basin, or Imhoff tank, is a two story affair. This style of basin has sides in each partition that extend vertically downward for only one foot from the surface of the sewage. From here two thin floors slope toward each other forming a small "V" opening for the settling sludge to pass through and separating the tank into two compartments. Gases forming in the lower compartment are prevented from rising through the "V" opening by placing a beam under it which extends beyond the edge of each floor slab and diverts the gases to either side of the opening. This may also be accomplished by extending one of the sloping floors about 6 or 8 inches beyond the other.

Sewage enters into the upper compartment from either end. The reason for this may be found in the behavior of sewage. Heavy matter in the sewage settles quickly upon reaching the basin. If it is allowed to enter at only one end, that end fills up at the bottom, and the sludge will not be spread out. By the method of either end it is spread effectively and insures better chance for decay.

The lower compartment is the digestion chamber where the sludge undergoes putrefactive decomposition. Hoppers in the bottom of the tank facilitate withdrawal of the sludge after digestion. The sludge is drawn off through pipes by means of hydrostatic pressure.

The methane gases given off by the decaying sludge escape between the walls of adjoining tanks, and the scum rises into these vents.

At one end of the Imhoff tanks are two dosing tanks. While one fills, the other empties its dose into the filter bed.

From the Imhoff tanks and dosing tanks the sewages goes to the filter beds. The essentials of filtration are very slow motion of very thin films of liquid over the surface of particles that have spaces between them sufficient to allow air to be in contact with these films, and the presence in the filter of certain bacteria to produce oxidation of the dissolved organic matter in the sewage.

The filter in use here is the trickling filter with a depth of nine feet. The filter material is a durable stone. Ample drainage facilities are provided for on the bottom by a vitrified clay furrow and ridge system spanned by "grill blocks".

One 24-inch pipe carries the settled sewage from the dosing tank to the filter where a division is made along the edge of the bed by 16-inch pipes. At evenly spaced intervals 8-inch pipes branch off across the filter bed. These are controlled by hand-wheel gate valves. Nozzles are staggered on the apex of equilateral triangles along the pipes on the bed. At the beginning of discharge from one dosing tank the head on the nozzle is high. As the tank empties the head falls. This causes a wide overlapping spray at maximum head with a contracting radius as the head falls.

We find two main disadvantages in this method.

1. It gives off an odor, at times, when spraying is in operation.
2. In very cold weather, after the passage of one dose, the valves may freeze while waiting for the next to come through.

Compare this with an advantage and disadvantage of the traveling arm system of filtration.

Advantage:

The liquid sewage has no time to freeze in this method due to the continuous sprinkling operation.

Disadvantage:

Our only drawback to the traveling arm is the patent which exists on it.

At one corner of the filter bed is a test basin where samples are taken of the filtered sewage for analysis in the laboratory.

From the filter bed the effluent flows to the humus tank or secondary settling tank during times of peak load in the main sludge basin. The sludge settling here is scraped up by a rotary blade scraper having pivot and extension arms.

This sludge is then pumped back to the "Imhoff" tanks where it is digested and drawn off with the sludge settling in the first process.

In times other than peak load the effluent from the filter bed is by-passed around the humus tank by 24-inch vitrified pipe which also carries the effluent of the humus tank. This pipe carries the effluent to the Olentangy River.

Beyond the dike, over the southeast corner, are the sludge drying beds where the sludge from the "Imhoff" tanks is deposited. After the sludge has been sufficiently dried in these beds it is hauled off, as needed, in trucks to be used as fertilizer.

Latest definition of a perambulator: blunder-bus. —Minn. Techno Log.

"Is an editor a man who puts things in the magazine?"

"No, you fool, an editor is a man that keeps things out of the magazine."

Jack: "Say, Gus, what is this steel wool I hear so much about"

Gus: "I'm not sure, but I think it is made from the fleece of hydraulic rams."

"Your boys are graduating from college rather late. What kept them back so long? Are they delicate?"

"No, they're athletes."

"This university certainly takes an interest in a fellow, doesn't it?"

"How's that?"

"Well, I read that they will be very glad to hear of the death of any of their alumni."

He: "Do you know the secret of popularity?"

She: "Yes, but mother says that I mustn't."—Ohio State Engr., Nov. 1928.